Preminary Results:

Rain at the Ice Edge & AMSR-E in XCAL

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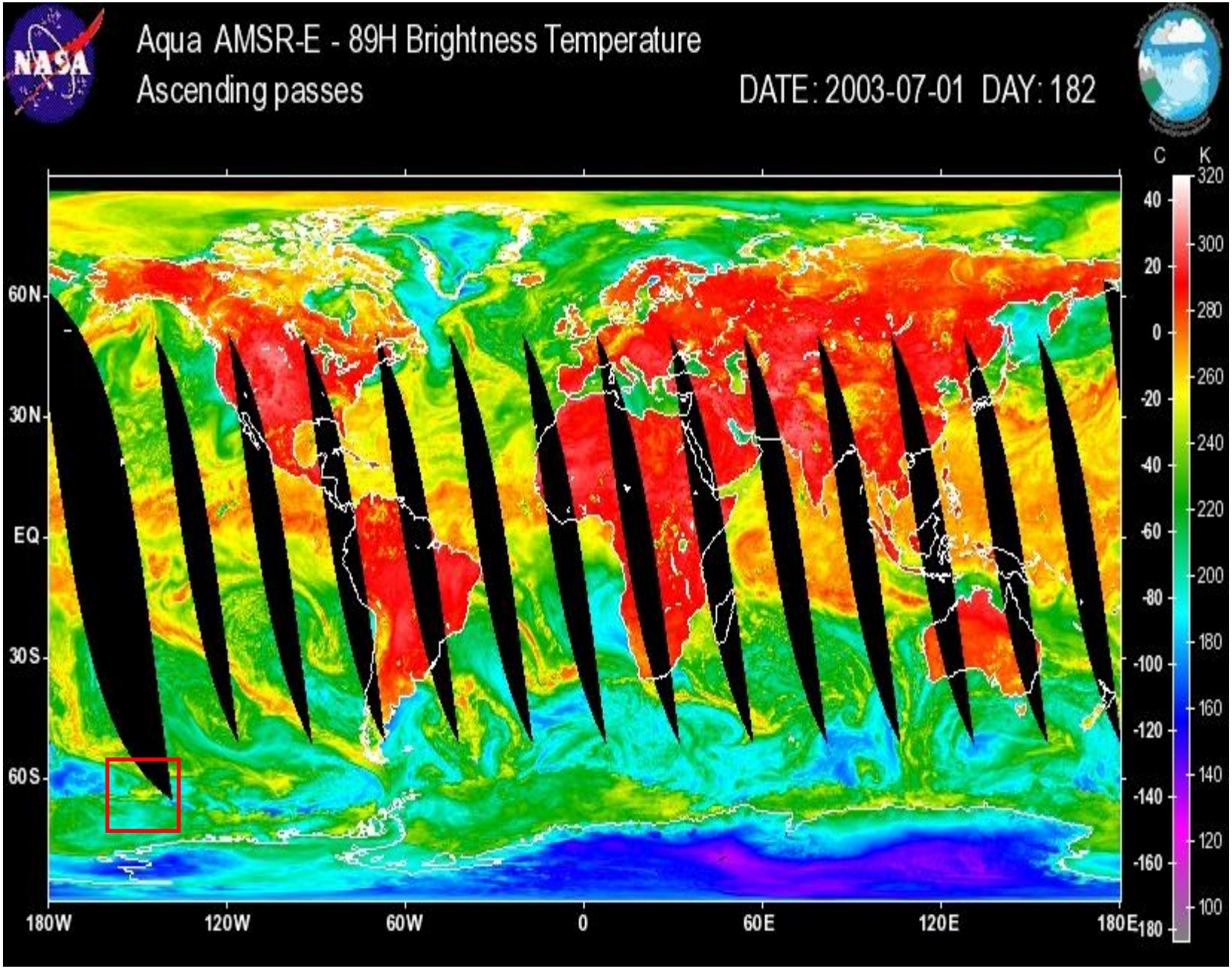
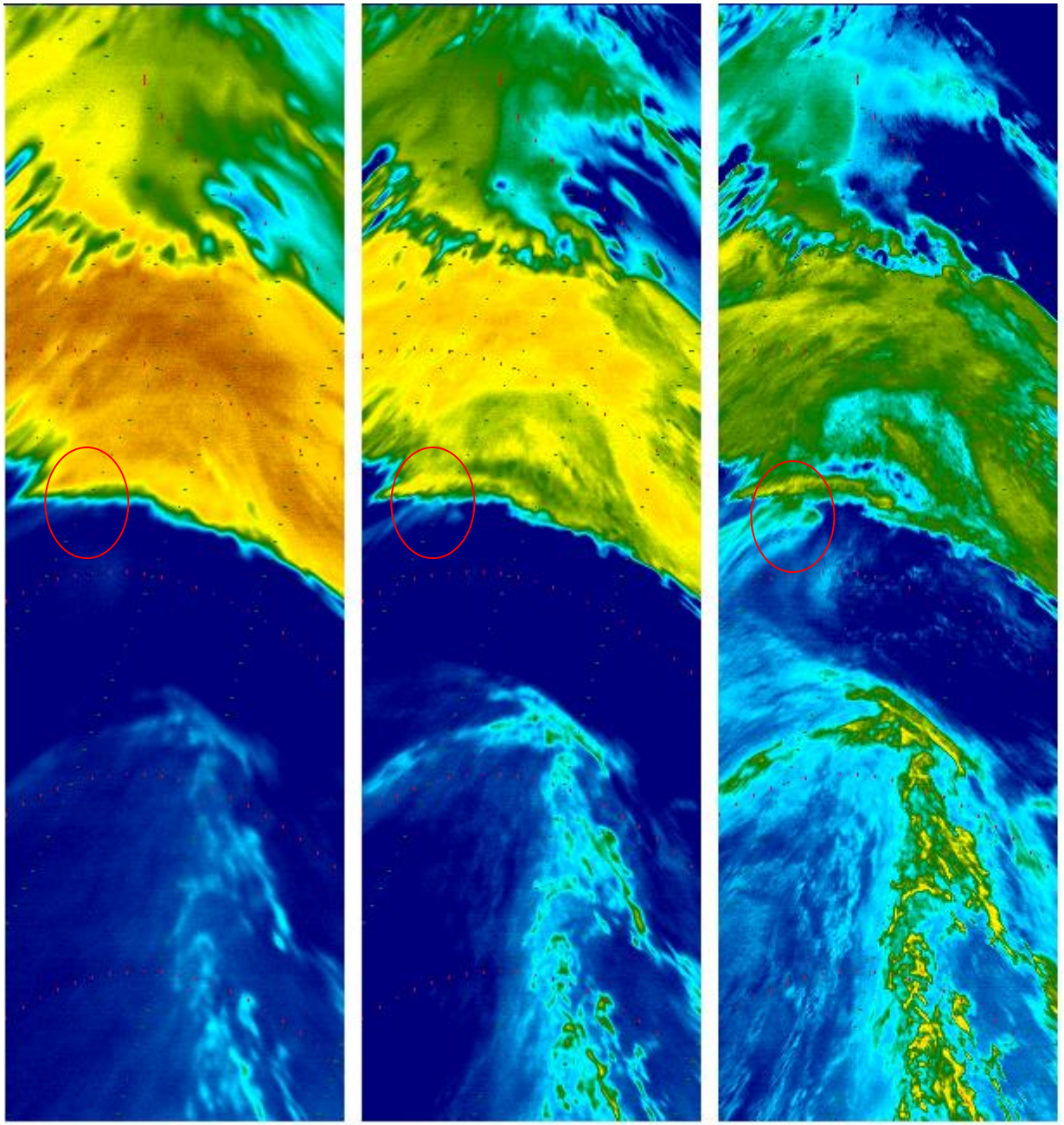
Rain at the Ice Edge

Problem:
Viewed simply, Sea Ice and rain look similar.
Can we tell them apart?

Temporal continuity is one approach
Inconvenient.

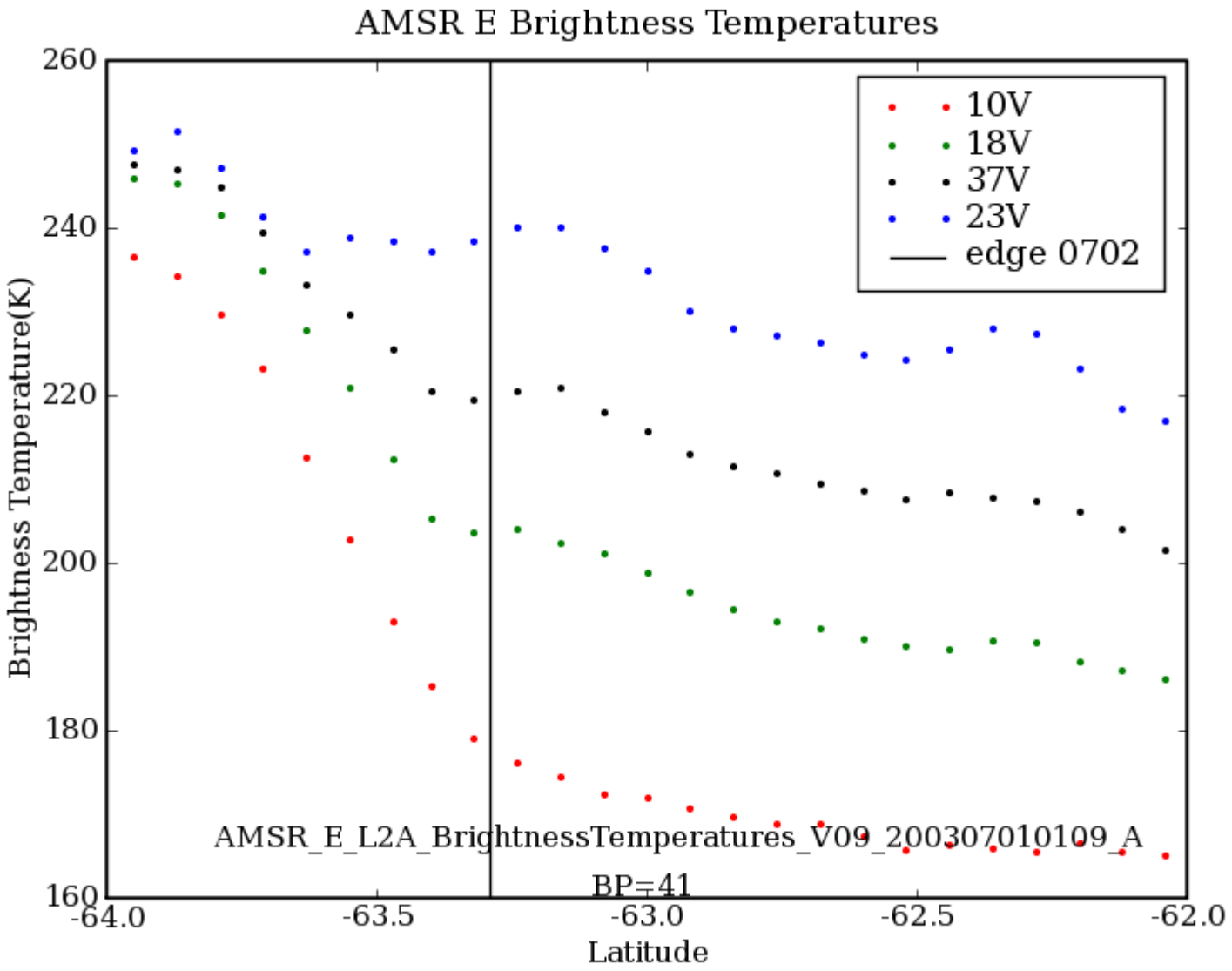
Wouldn't expect polarization to be useful here.
What about the spectral characteristics?
We will look at it through the TAMU rain algorithm.
with a few modifications for high latitude work.

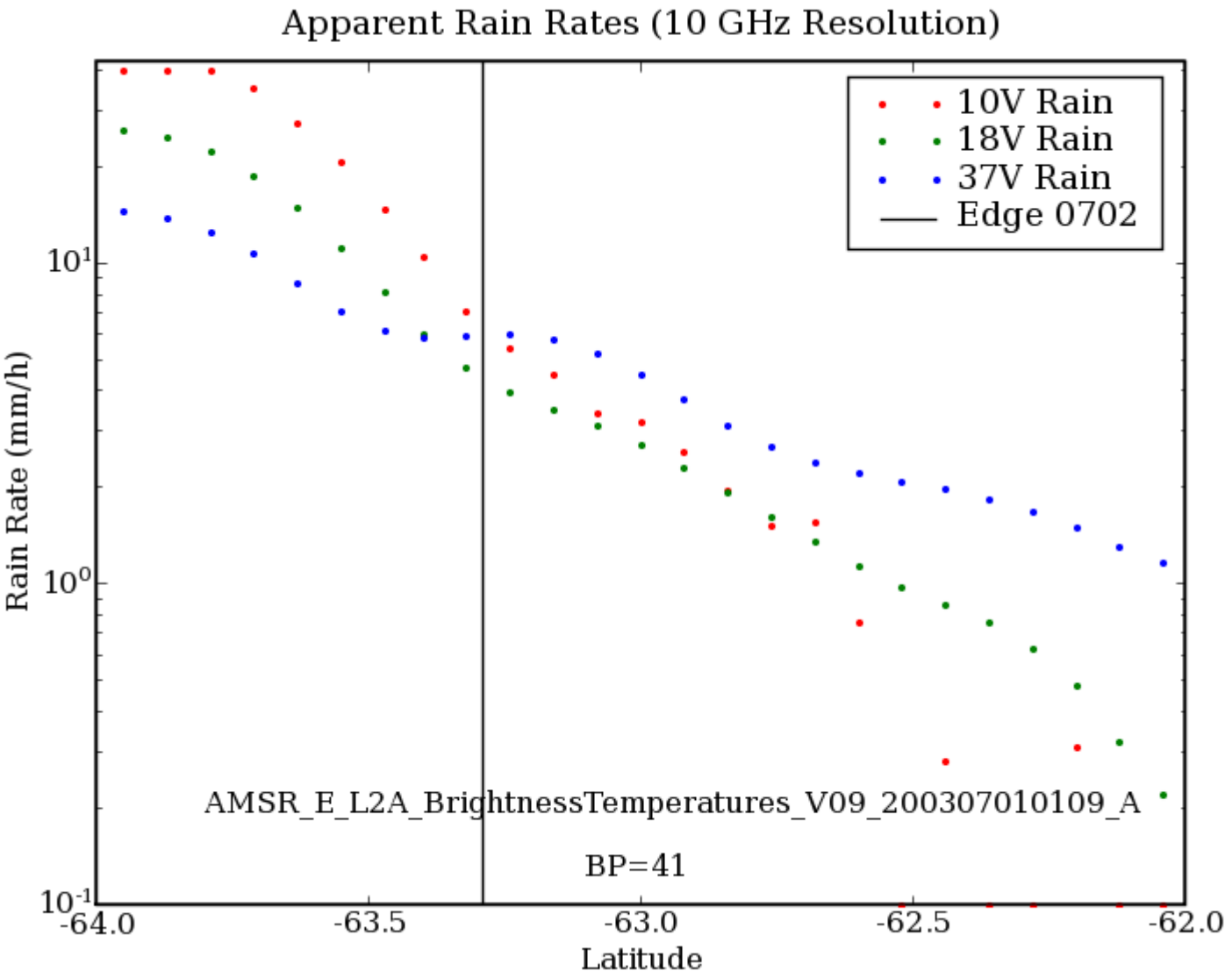

Aqua AMSR-E - 89H Brightness Temperature
Ascending passes
DATE: 2003-07-01 DAY: 182
C
K
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
320
300
280
260
240
220
200
180
160
140
120
100
60N
30N
EQ
30S
60S
180W
120W
60W
0
60E
120E
180E

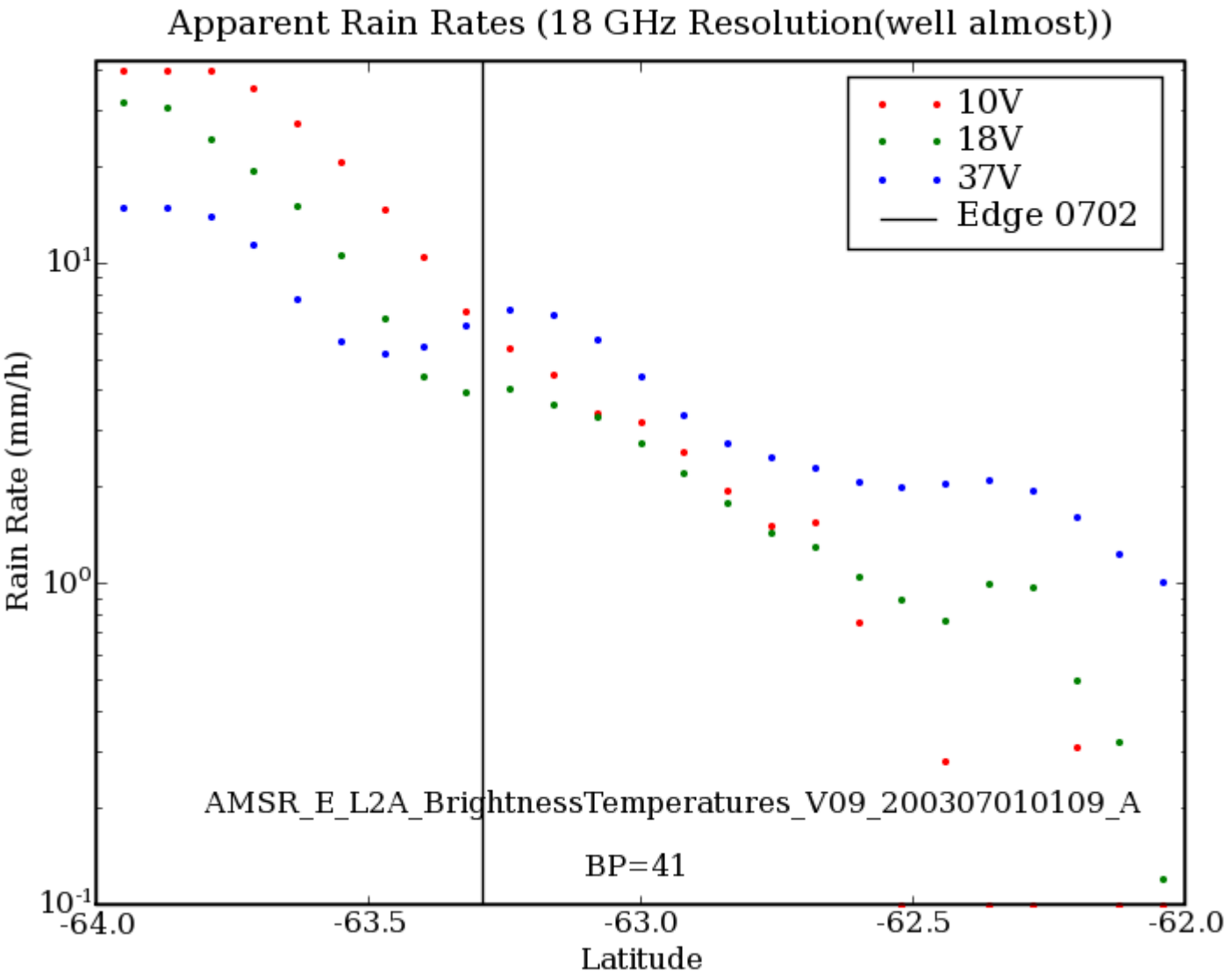


AE VERSION 9
START TIME
2003/ 7/ 1
1: 9:56
END TIME
2003/ 7/ 1
1:26: 4
UL LAT 74.3S
UL LON 293.5E
LR LAT 37.1S
LR LON 179.2E

10V 168 304
19V 189 305
37V 206 299


AMSR E Brightness Temperatures
260
240
220
200
180
160
Brightness Temperature(K)
-64.0
-63.5
-63.0
-62.5
-62.0
Latitude
10V
18V
37V
23V
edge 0702
AMSR_E_L2A_BrightnessTemperatures_V09_200307010109_A
BP=41


Apparent Rain Rates (10 GHz Resolution)
10V Rain
18V Rain
37V Rain
Edge 0702
Rain Rate (mm/h)
10^1
10^0
10^{-1}
AMSR_E_L2A_BrightnessTemperatures_V09_200307010109_A
BP=41
-64.0
-63.5
-63.0
-62.5
-62.0
Latitude


Apparent Rain Rates (18 GHz Resolution(well almost))
10V
18V
37V
Edge 0702
Rain Rate (mm/h)
10^1
10^0
10^{-1}
AMSR_E_L2A_BrightnessTemperatures_V09_200307010109_A
BP=41
-64.0
-63.5
-63.0
-62.5
-62.0
Latitude

Rain at Ice Edge

When Ice Substantially Fills the FOV, Rain Retrievals are Inconsistent.

Near the Ice Edge, Not So Much.

Need to Look at More Cases.

What is X-CAL?

OBJECTIVE

To make the GPM rain data set as clean and self-consistent as possible

CONTEXT: 3 Layer Process

Calibrate individual instruments as well as possible

Instrument Manufacturers

Cross Calibrate instruments

Intercalibration (X-CAL) Working Group

Statistical Comparisons at Rain Retrieval Level

Algorithm Teams

Develop techniques for comparing similar, but not identical, microwave radiometers

Develop implementation strategy for routine intercalibration of constellation radiometers

Develop Traps and corrections for recurring instrument errors.s.

X-CAL Status

TMI/Windsat Comparison in cleanup stage.
Consensus Standard (Mark 1)

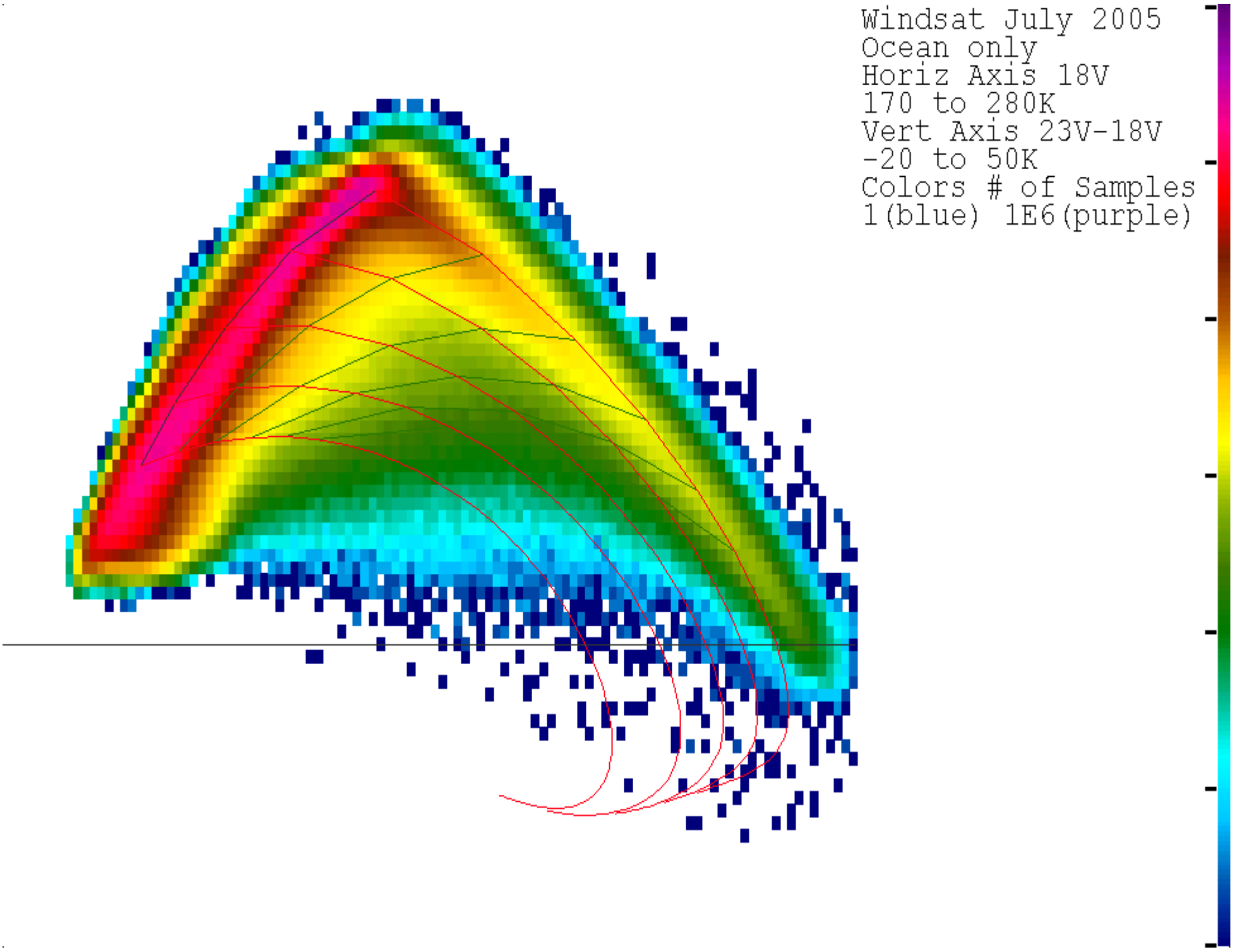
Starting to bring AMSR-E into X-CAL

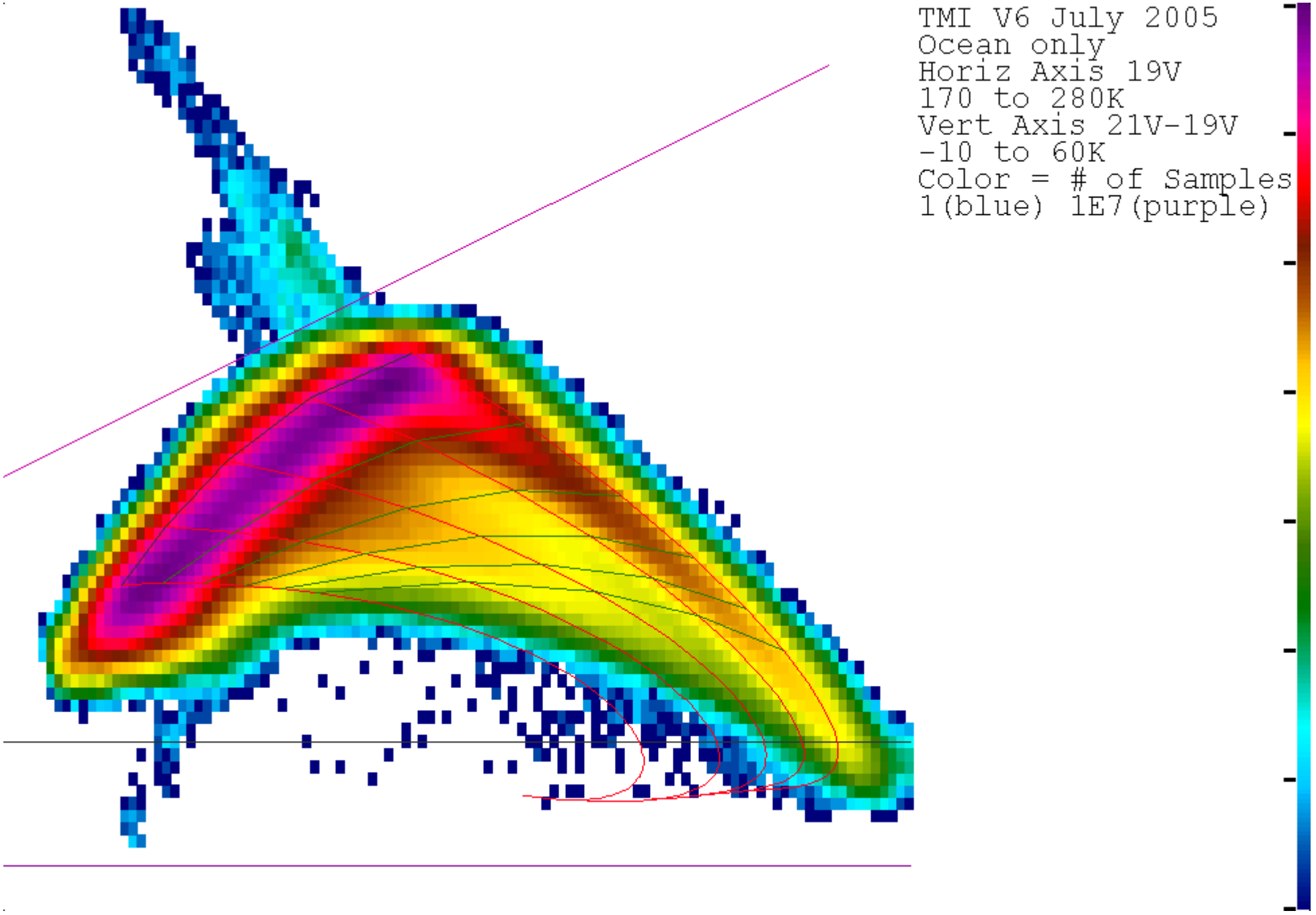
Process
- **Prescreen Data:**
- **Unphysical Data**
- **Scan-wise Anomalies**
- **Orbit-wise Anomalies**

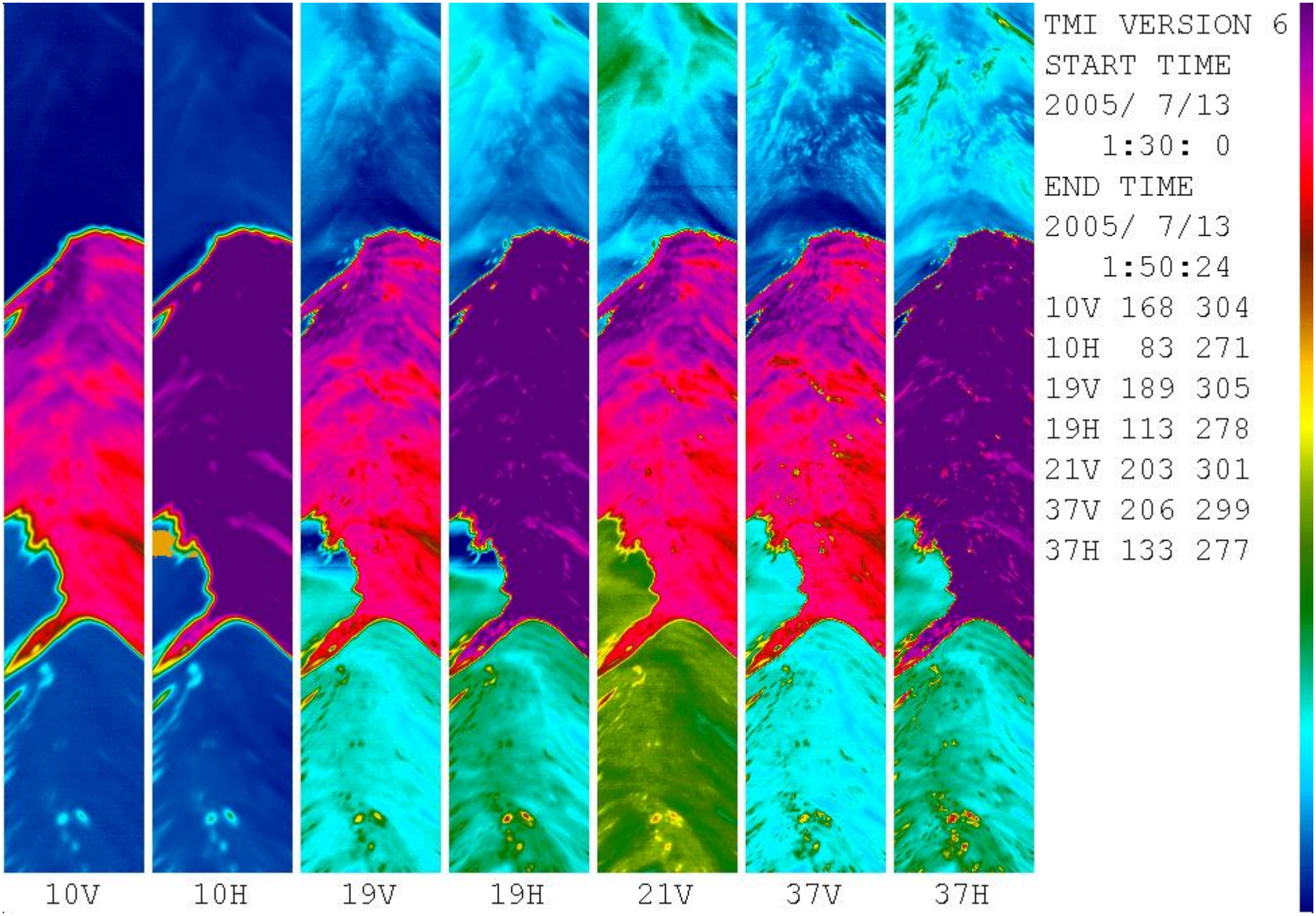
Compare Tbs
- **Matchup Data Set**
- **Limiting Value Approaches**

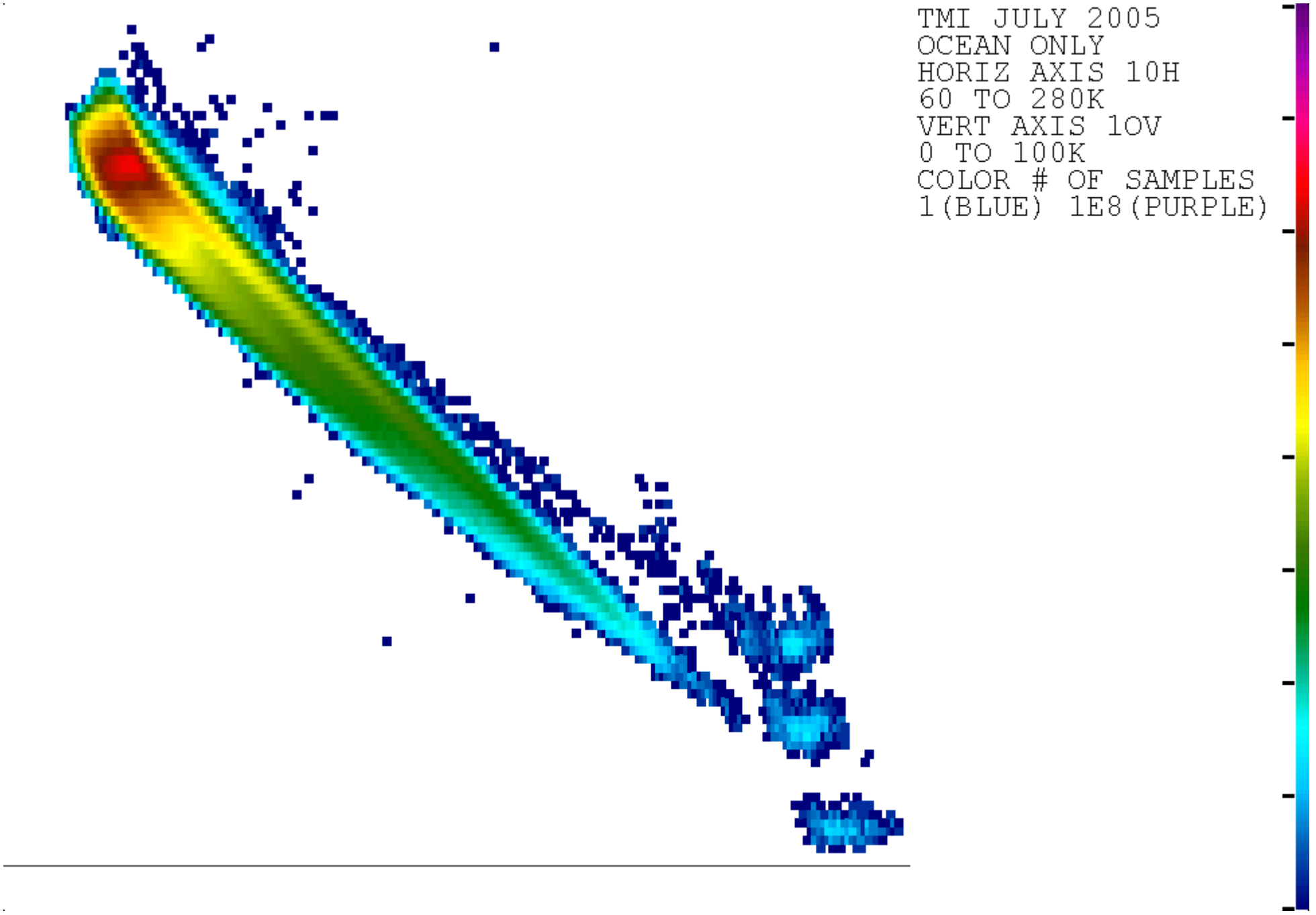
Generate adjustments to Consensus Standard

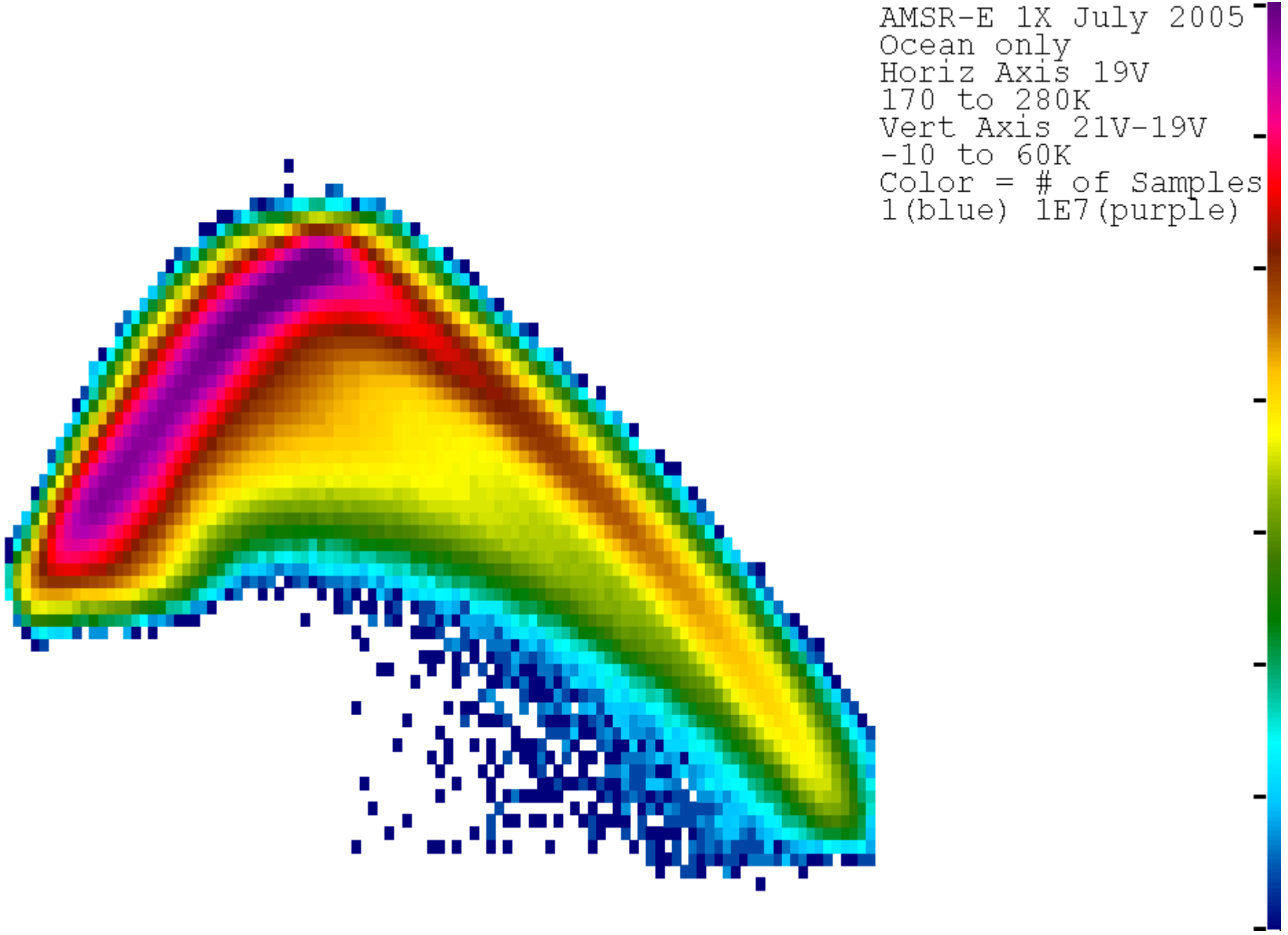
We are Starting Prescreening on Level 1X data from GSFC/JAXA
Data became available about 2 weeks ago.

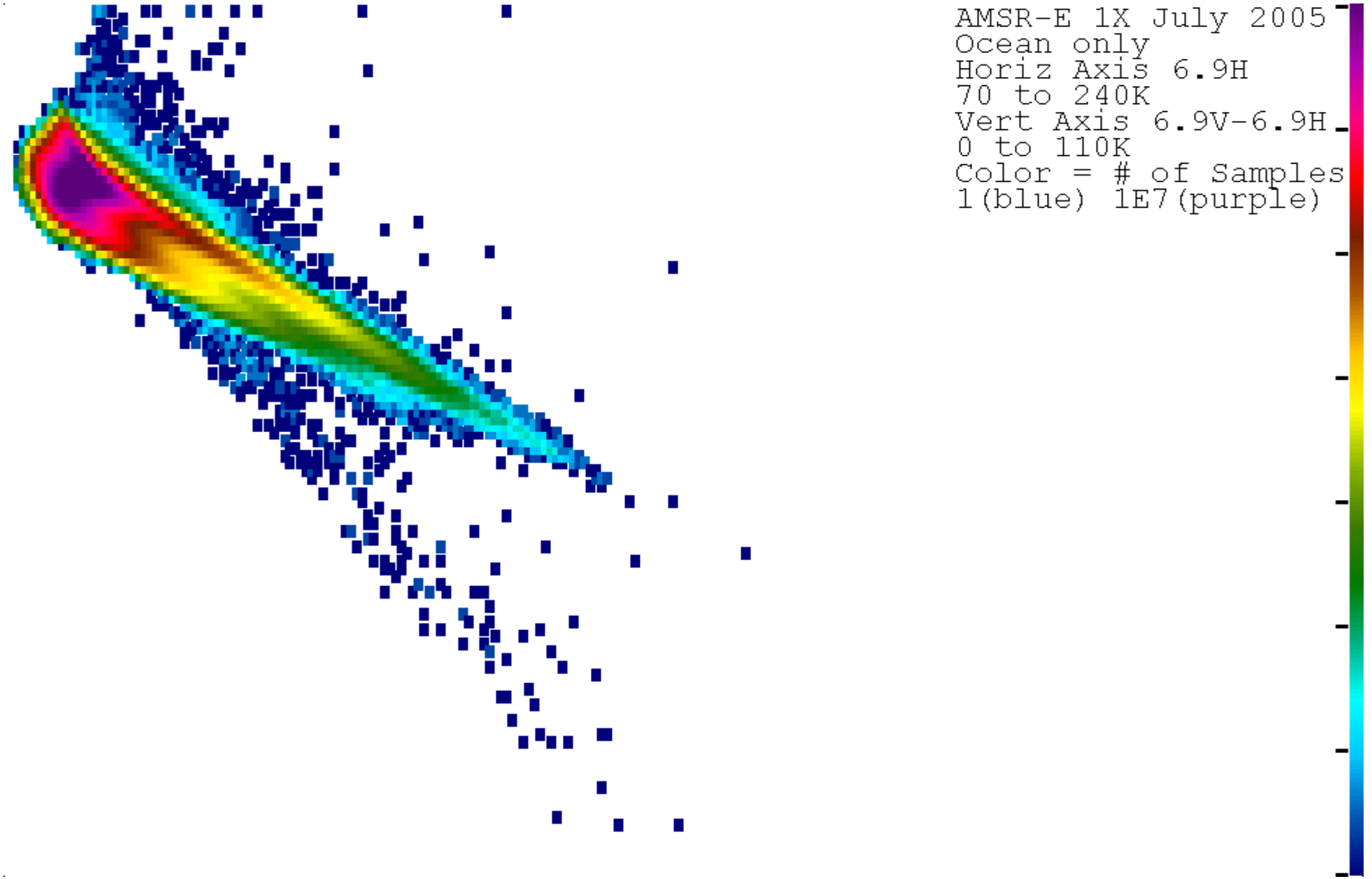

Windsat July 2005
Ocean only
Horiz Axis 18V
170 to 280K
Vert Axis 23V-18V
-20 to 50K
Colors # of Samples
1(blue) 1E6(purple)

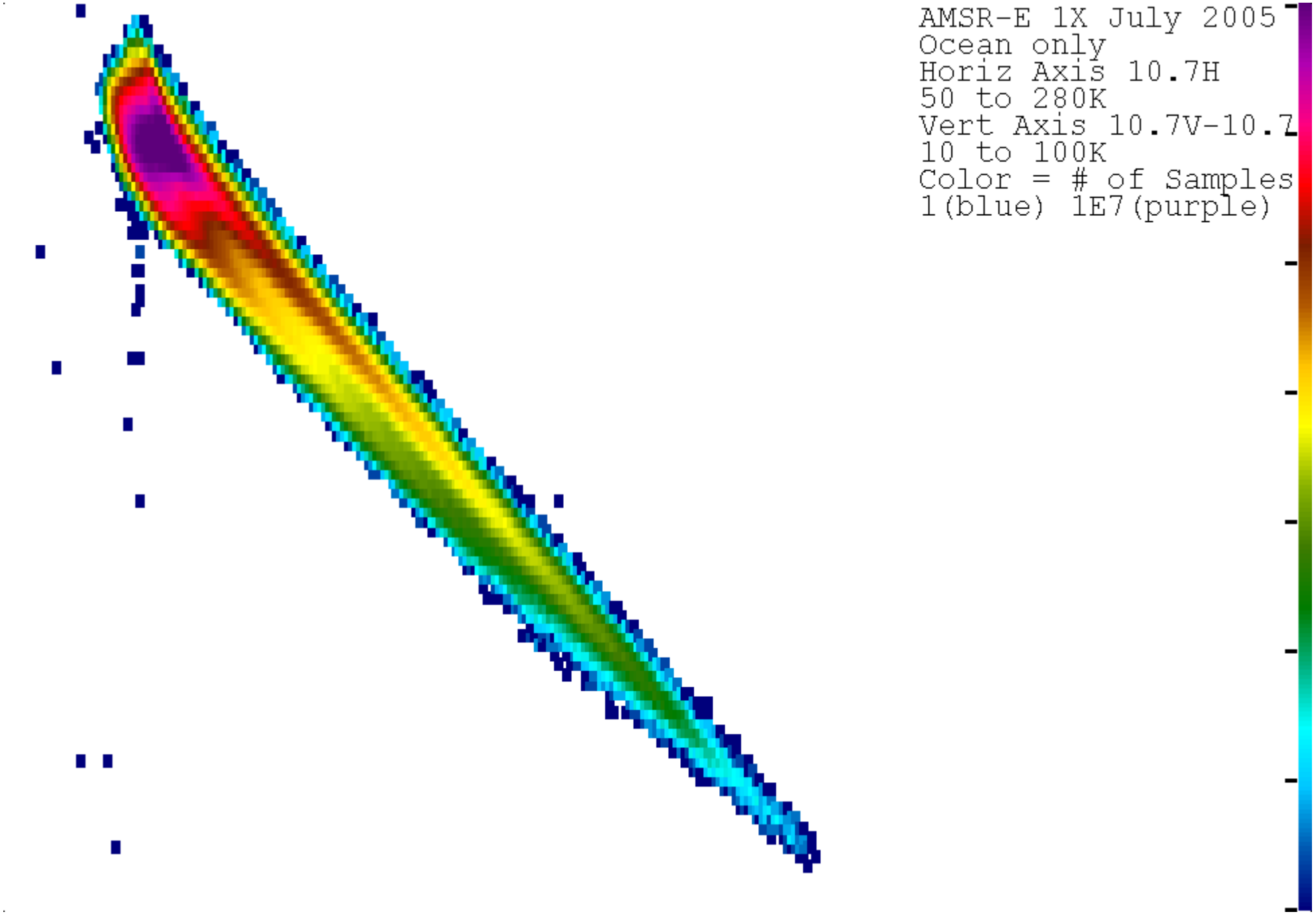

TMI V6 July 2005
Ocean only
Horiz Axis 19V
170 to 280K
Vert Axis 21V-19V
-10 to 60K
Color = # of Samples
1(blue) 1E7(purple)

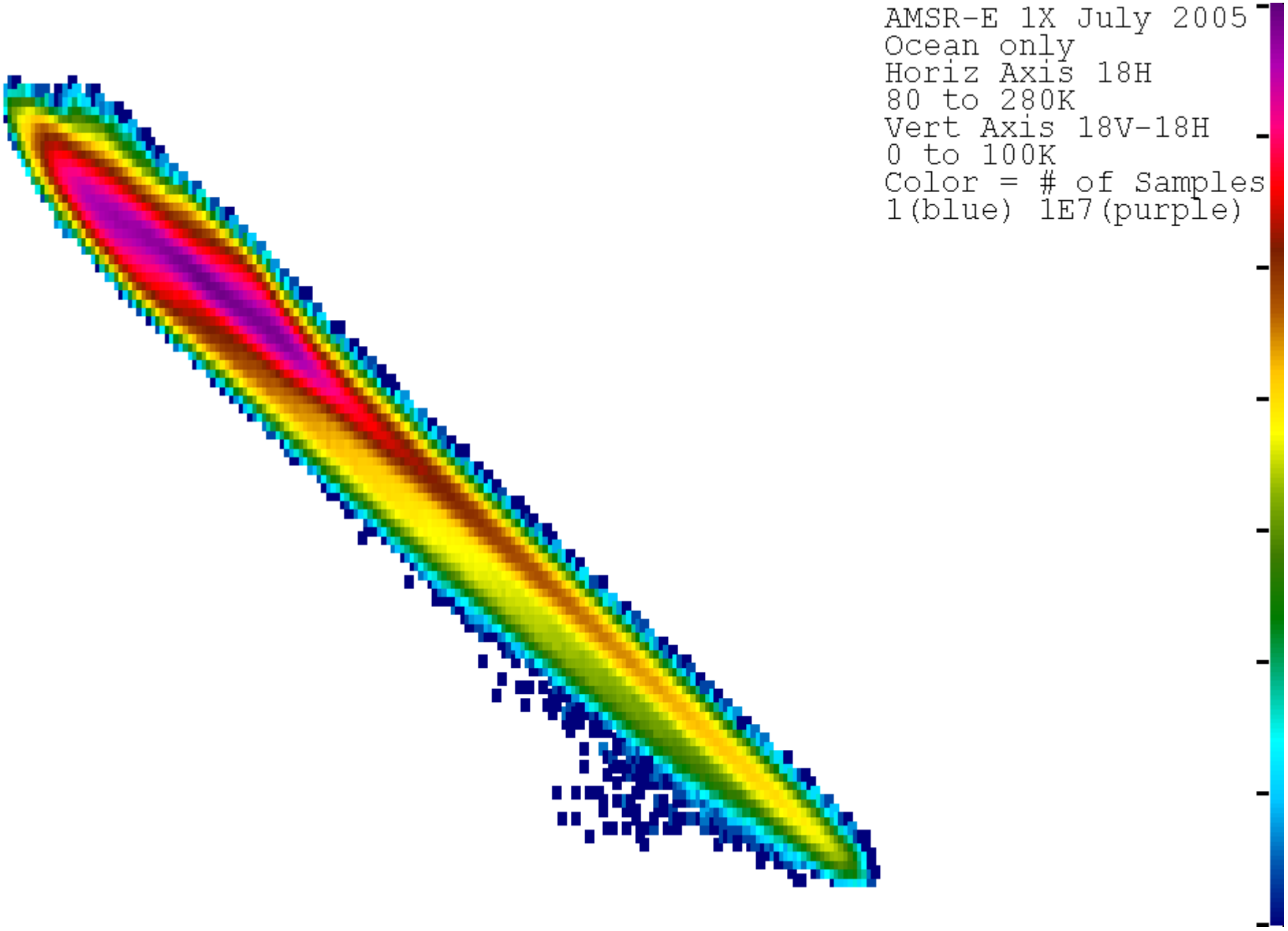

TMI VERSION 6
START TIME
2005/ 7/13
1:30: 0
END TIME
2005/ 7/13
1:50:24
10V 168 304
10H 83 271
19V 189 305
19H 113 278
21V 203 301
37V 206 299
37H 133 277
10V
10H
19V
19H
21V
37V
37H

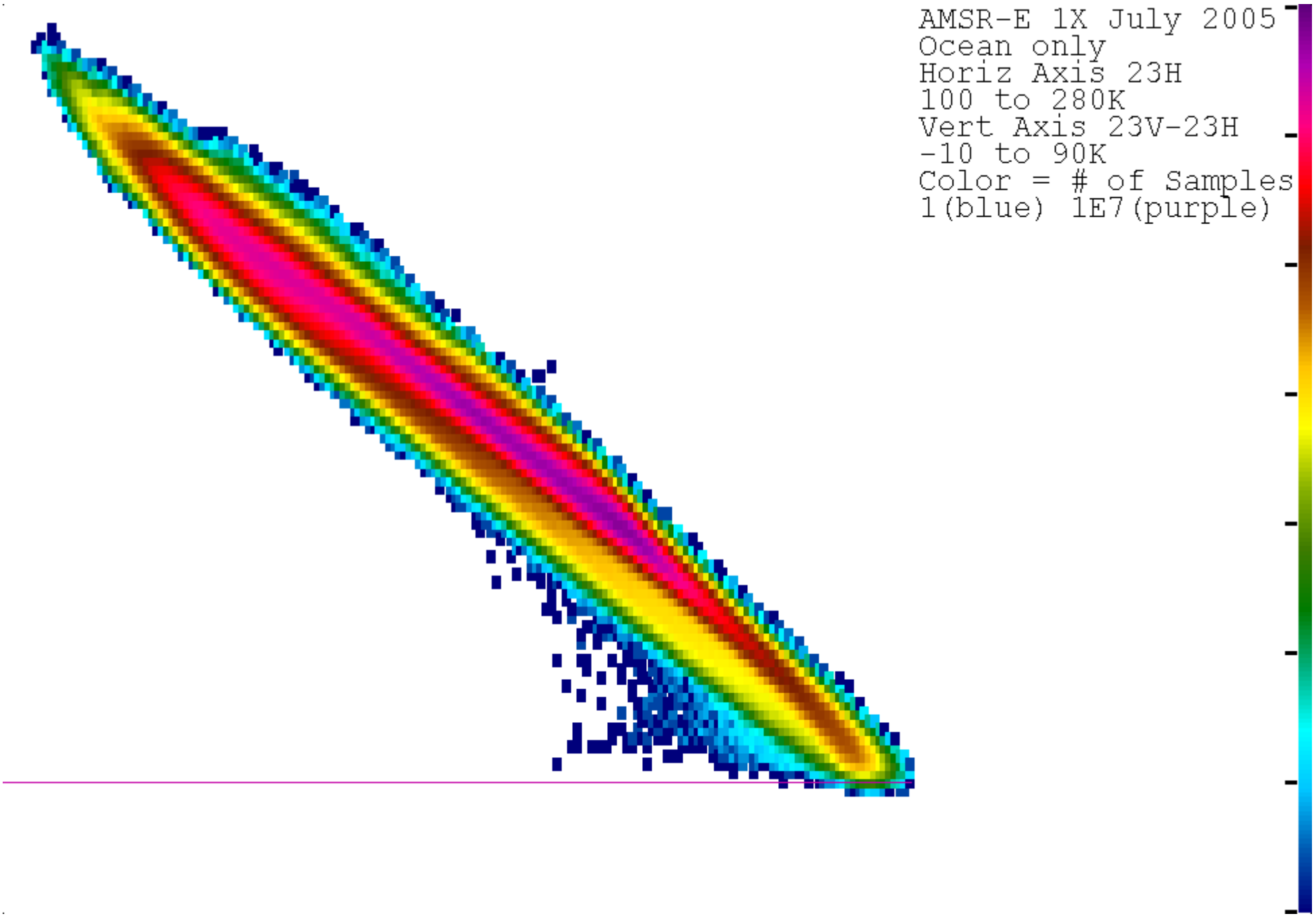

TMI JULY 2005
OCEAN ONLY
HORIZ AXIS 10H
60 TO 280K
VERT AXIS 1OV
0 TO 100K
COLOR # OF SAMPLES
1(BLUE) 1E8(PURPLE)

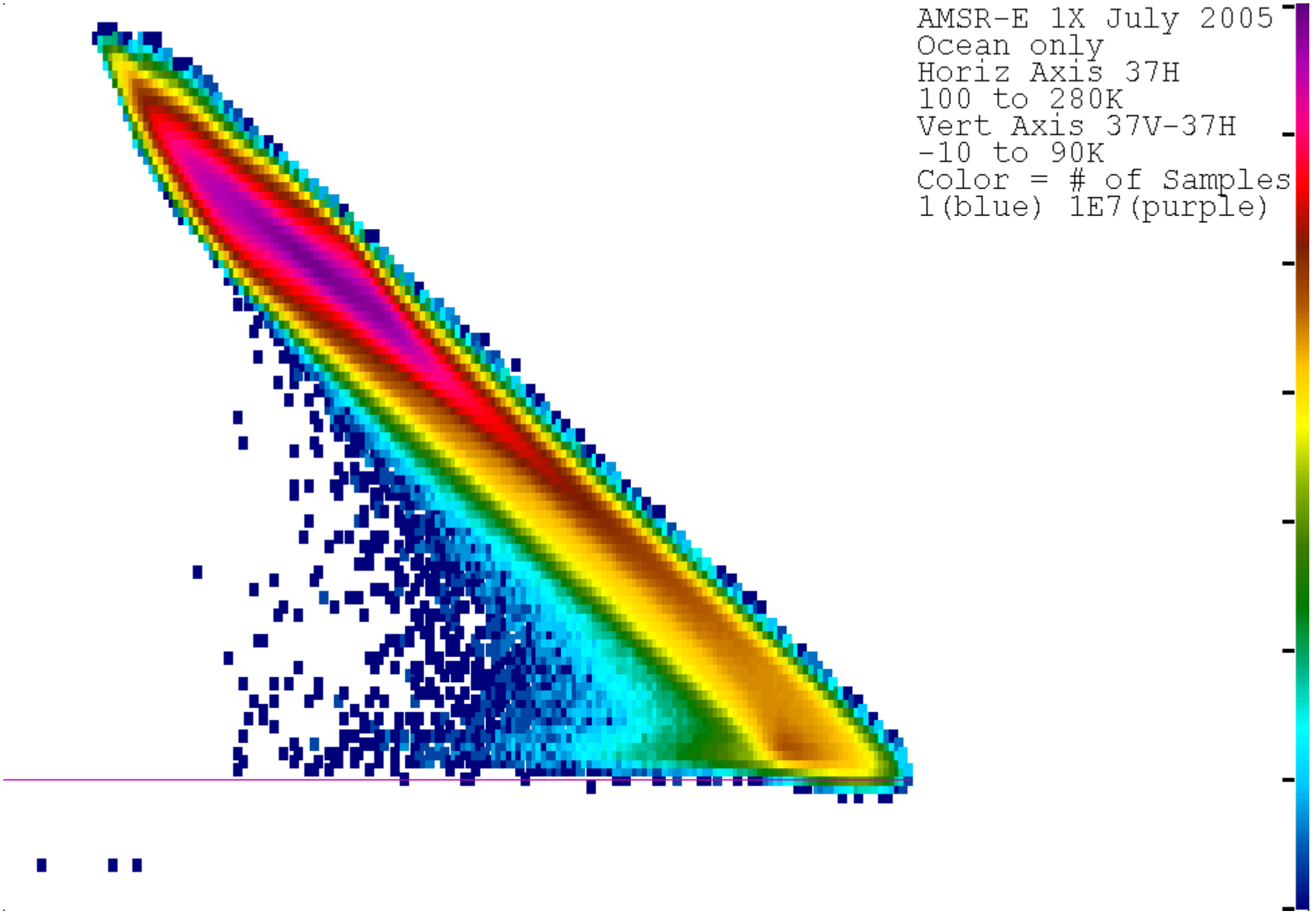

AMSR-E 1X July 2005
Ocean only
Horiz Axis 19V
170 to 280K
Vert Axis 21V-19V
-10 to 60K
Color = # of Samples
1(blue) 1E7(purple)


AMSR-E 1X July 2005
Ocean only
Horiz Axis 6.9H
70 to 240K
Vert Axis 6.9V-6.9H
0 to 110K
Color = # of Samples
1(blue) 1E7(purple)


AMSR-E 1X July 2005
Ocean only
Horiz Axis 10.7H
50 to 280K
Vert Axis 10.7V-10.7
10 to 100K
Color = # of Samples
1(blue) 1E7(purple)


AMSR-E 1X July 2005
Ocean only
Horiz Axis 18H
80 to 280K
Vert Axis 18V-18H
0 to 100K
Color = # of Samples
1(blue) 1E7(purple)


AMSR-E 1X July 2005
Ocean only
Horiz Axis 23H
100 to 280K
Vert Axis 23V-23H
-10 to 90K
Color = # of Samples
1(blue) 1E7(purple)

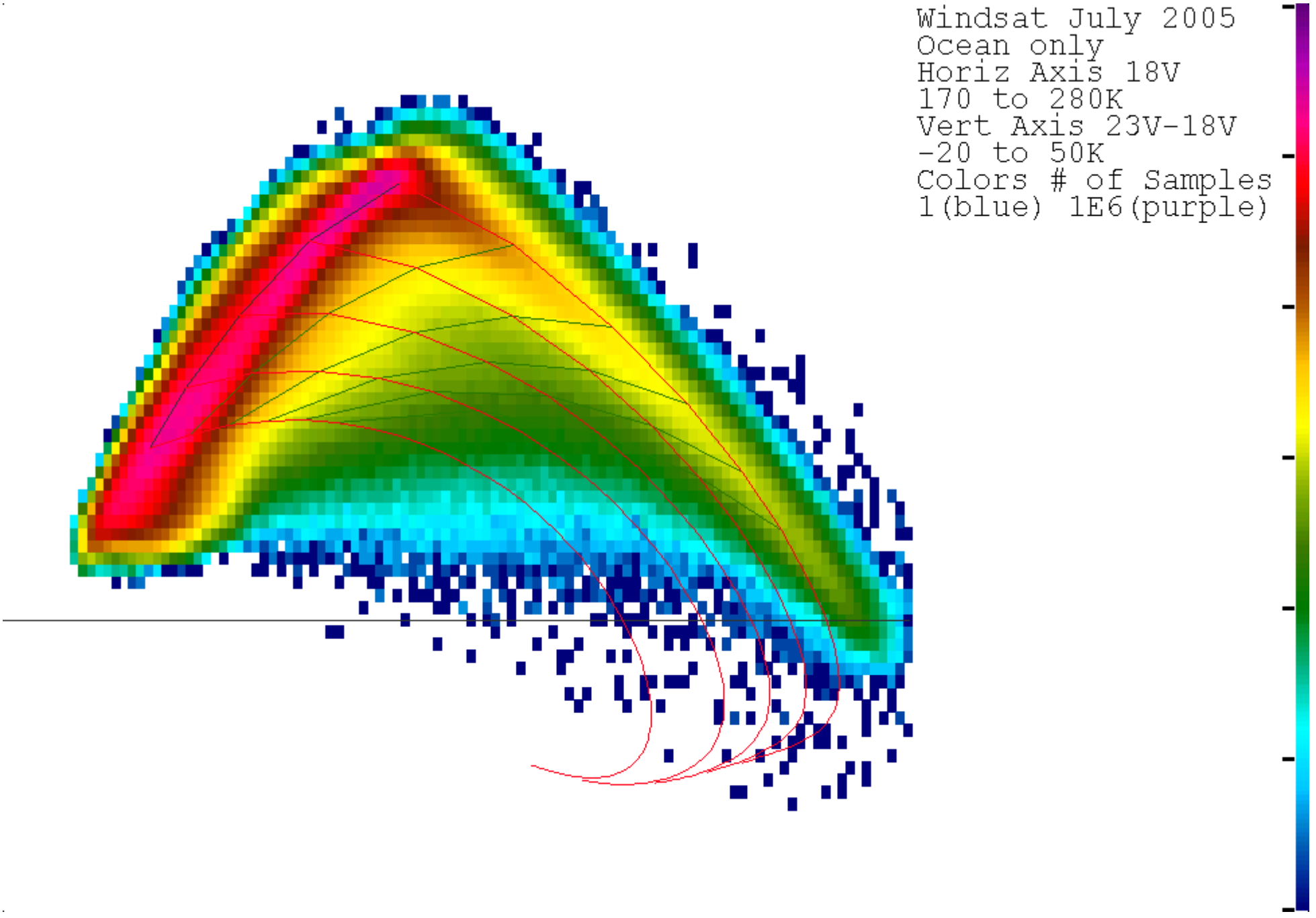

AMSR-E 1X July 2005
Ocean only
Horiz Axis 37H
100 to 280K
Vert Axis 37V-37H
-10 to 90K
Color = # of Samples
1(blue) 1E7(purple)

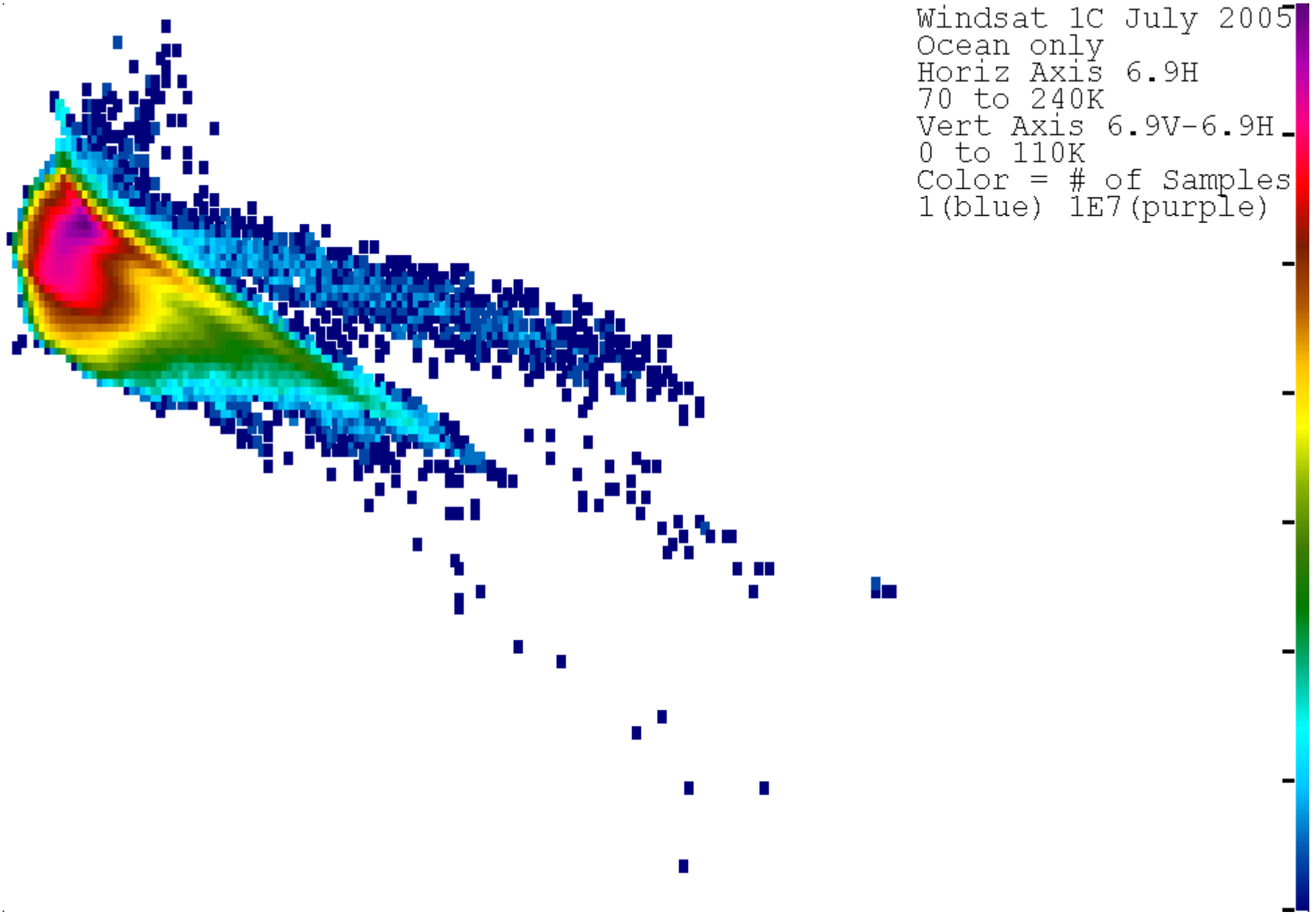
AMSR-E DATA

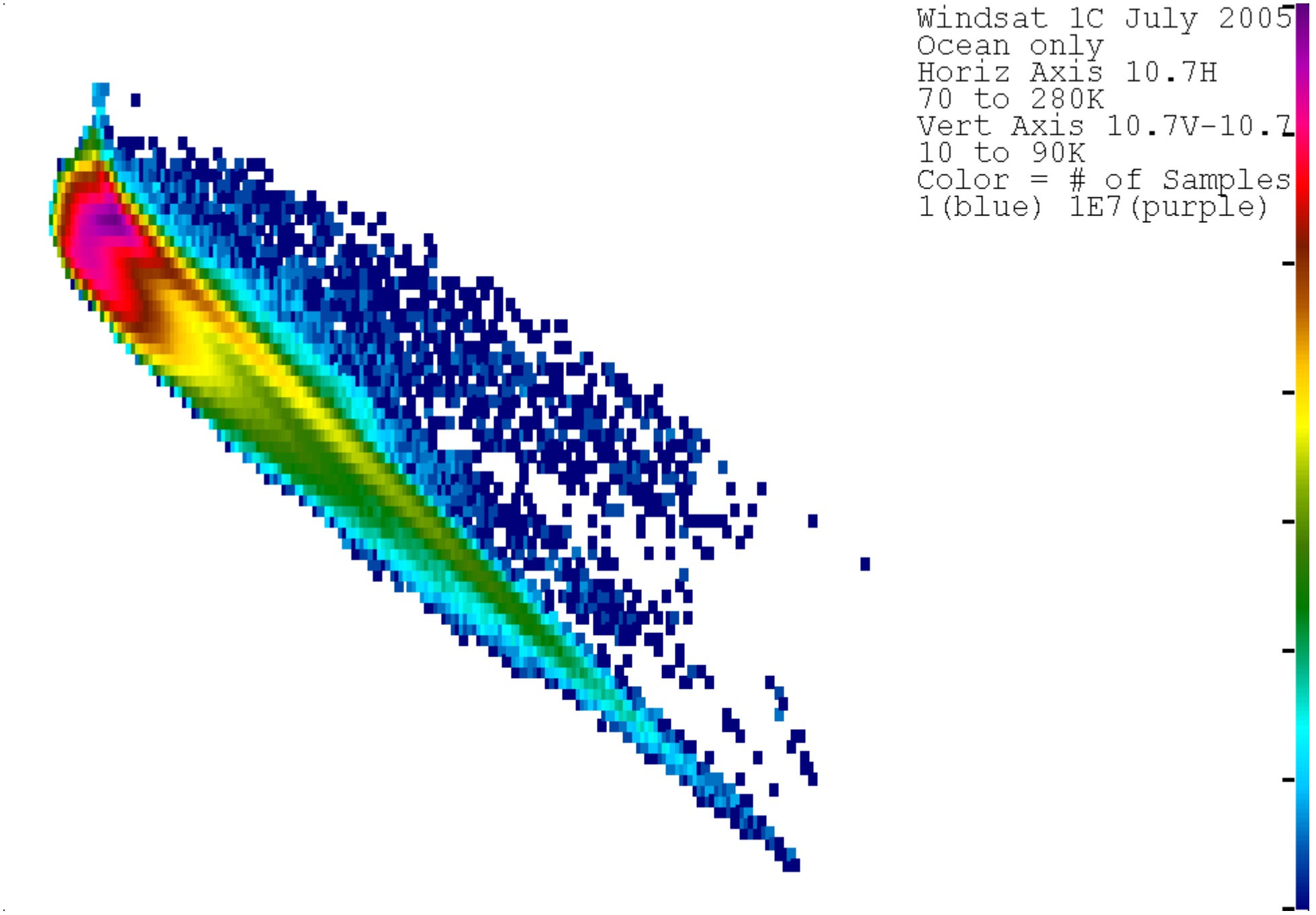
Lots of unphysical data at C-Band
What a surprise!
Some at X-Band

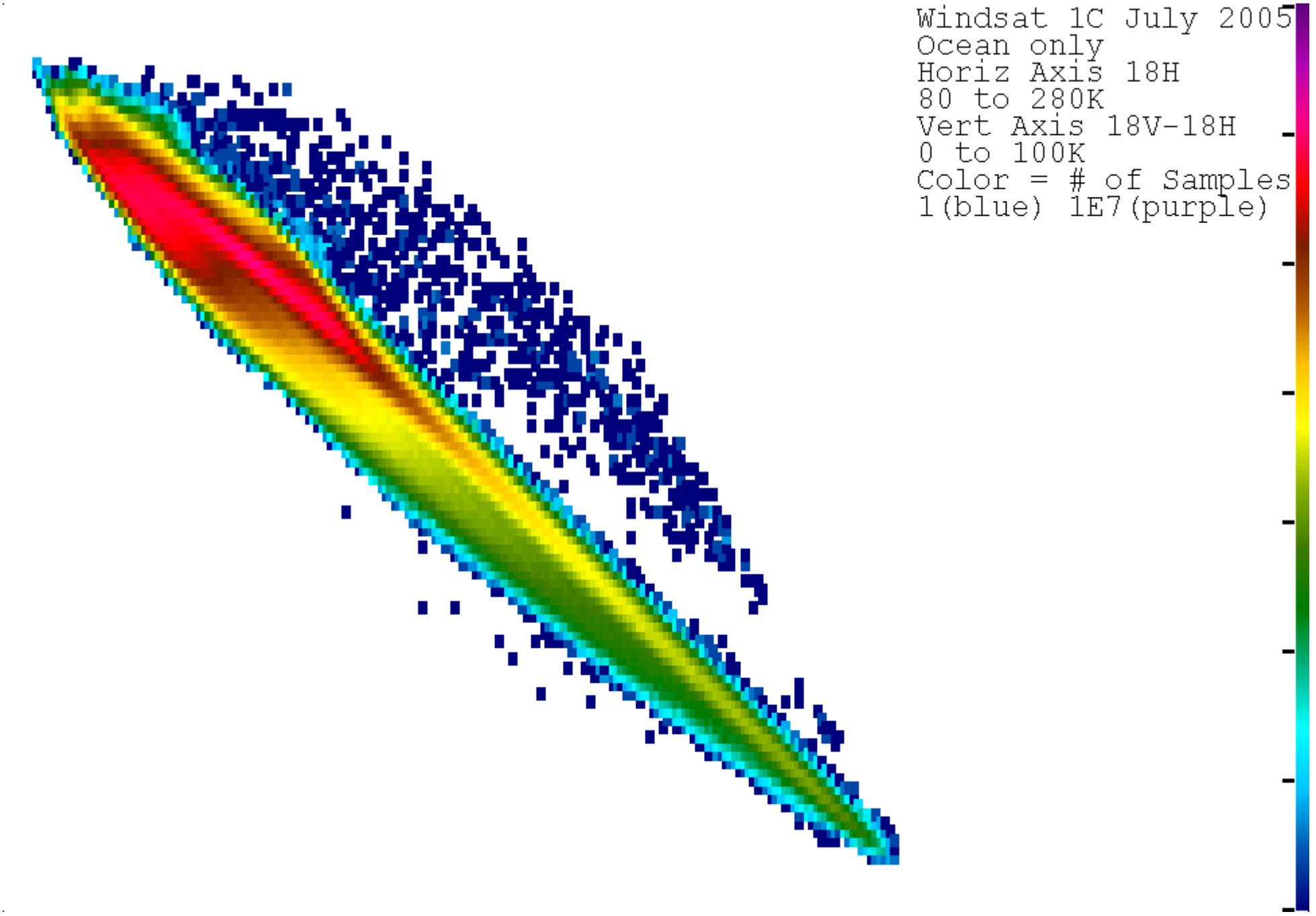
Otherwise pretty clean.

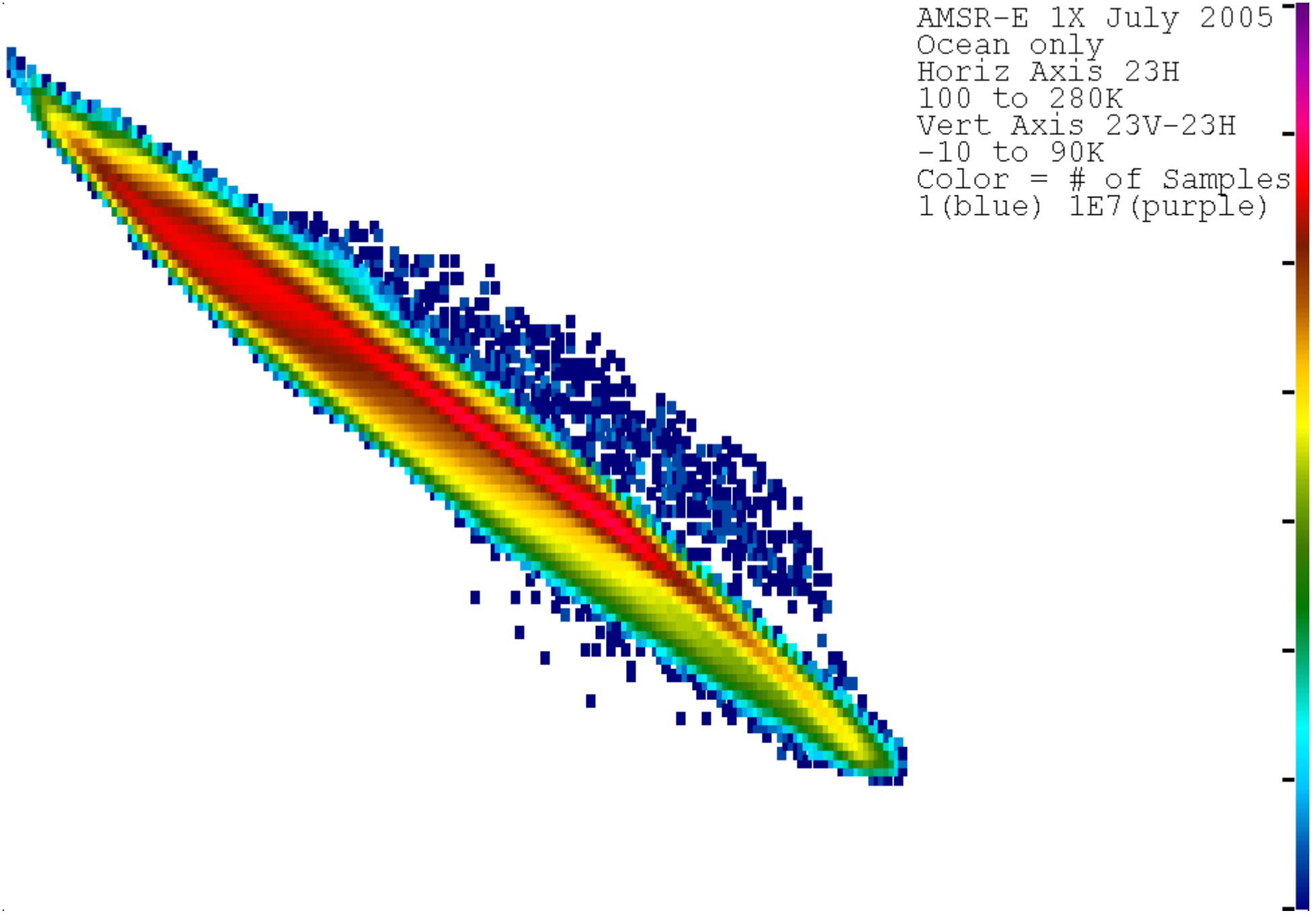
Spare Slides

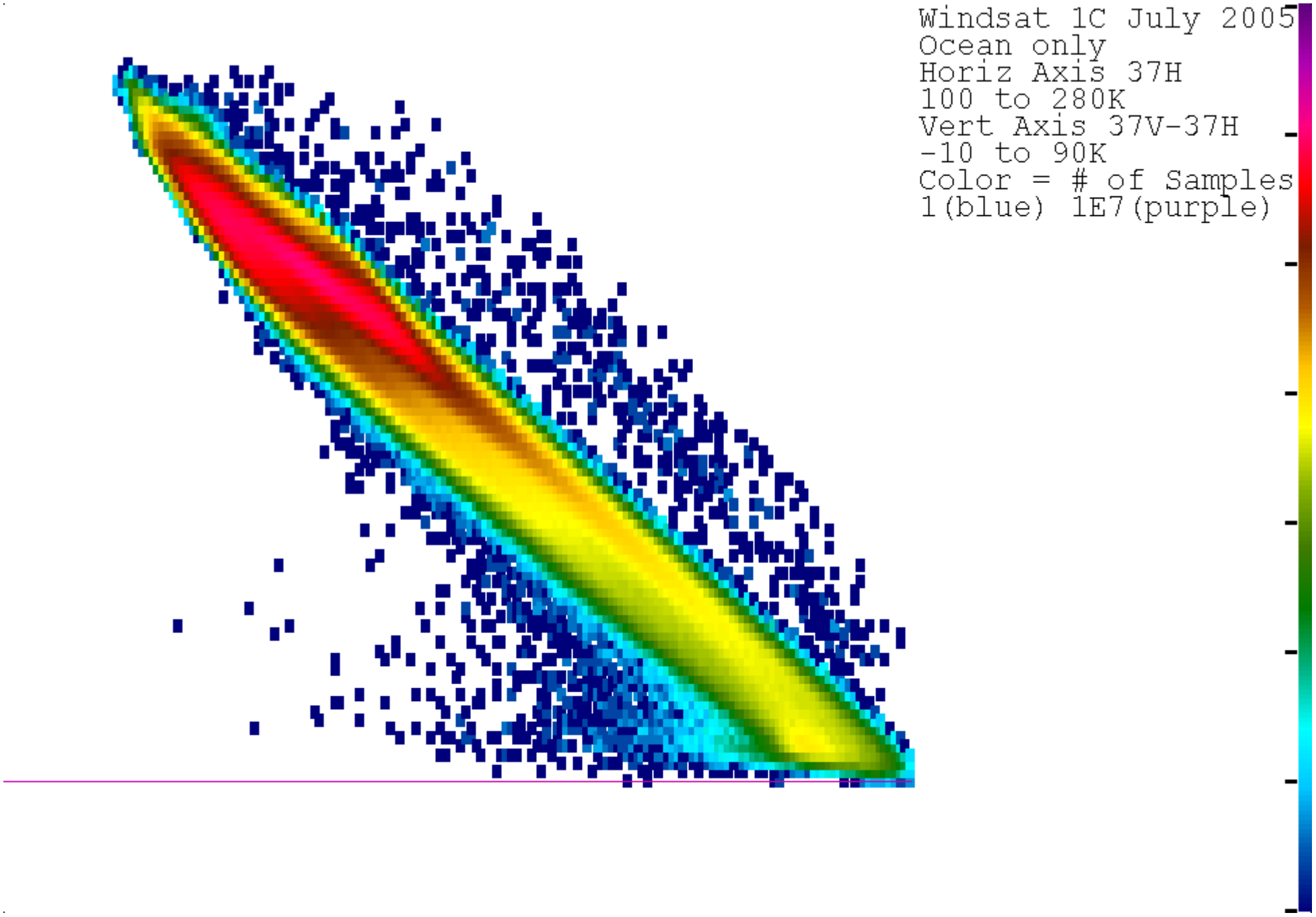

Windsat July 2005
Ocean only
Horiz Axis 18V
170 to 280K
Vert Axis 23V-18V
-20 to 50K
Colors # of Samples
1(blue) 1E6(purple)

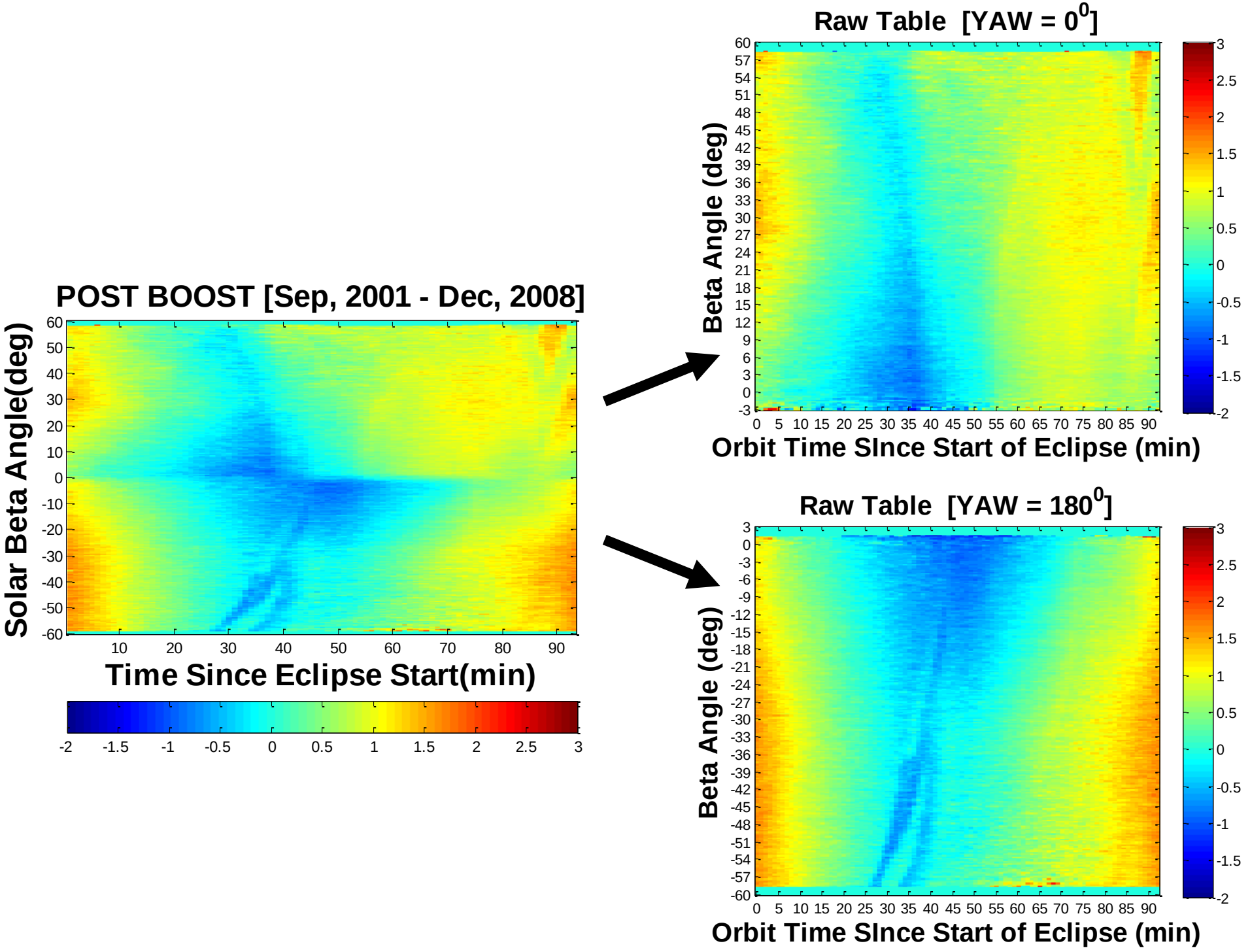

Windsat 1C July 2005
Ocean only
Horiz Axis 6.9H
70 to 240K
Vert Axis 6.9V-6.9H
0 to 110K
Color = # of Samples
1(blue) 1E7(purple)

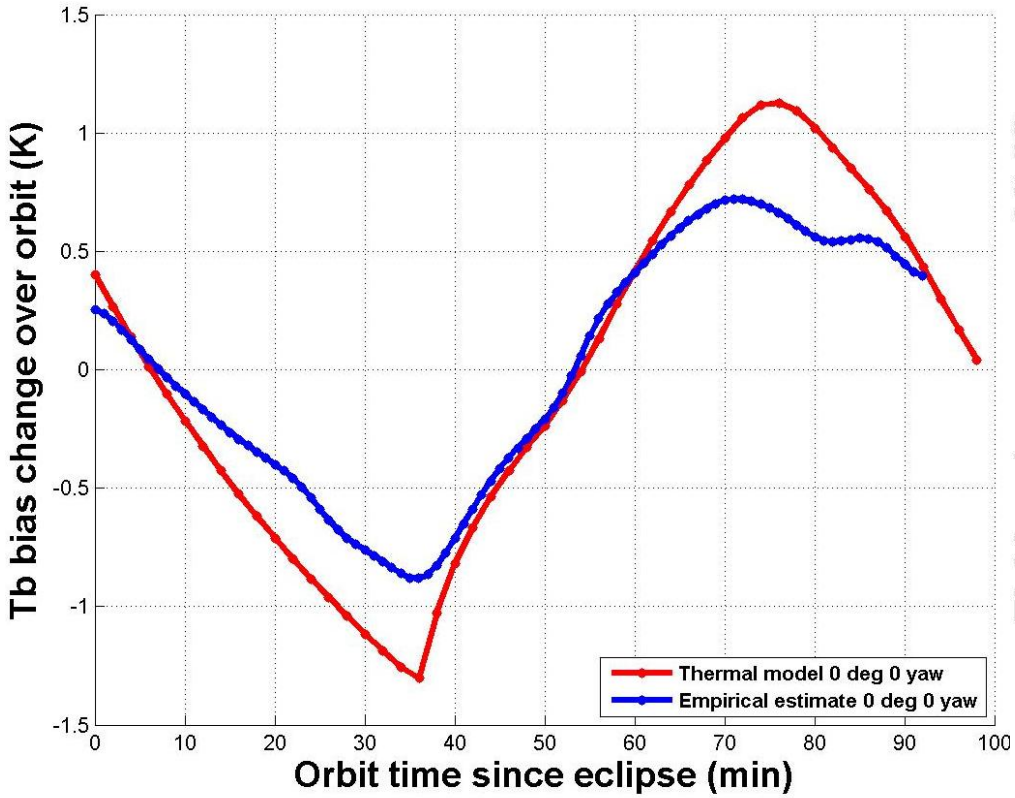

Windsat 1C July 2005
Ocean only
Horiz Axis 10.7H
70 to 280K
Vert Axis 10.7V-10.7
10 to 90K
Color = # of Samples
1(blue) 1E7(purple)

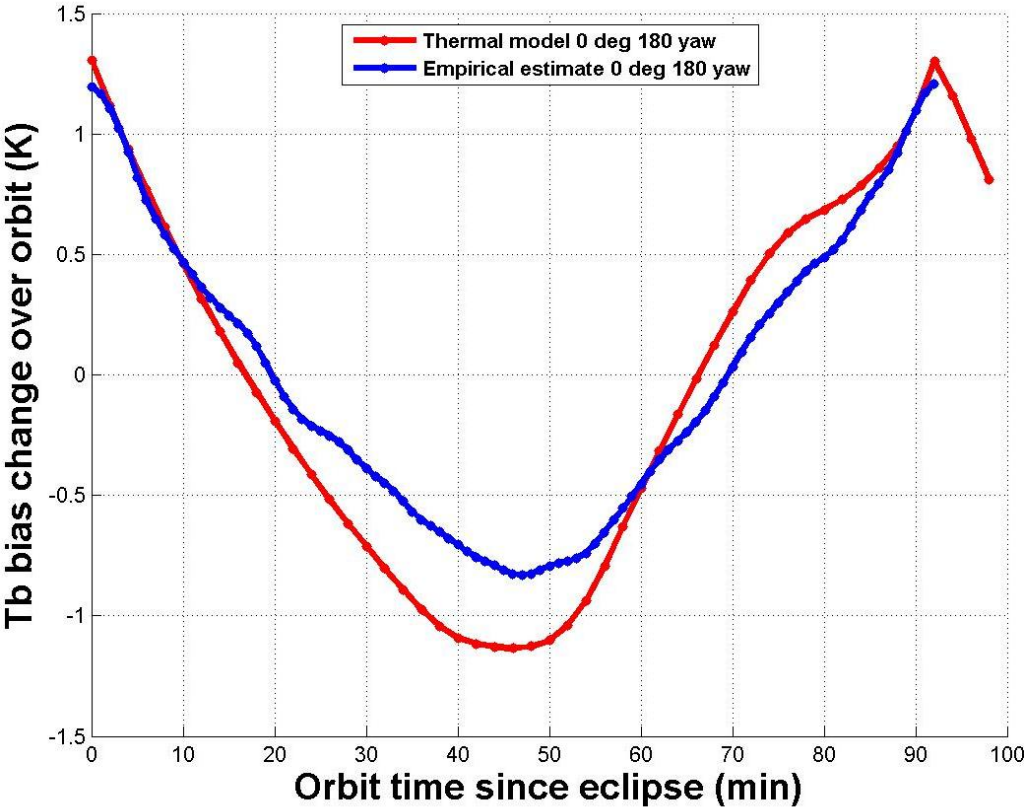

Windsat 1C July 2005
Ocean only
Horiz Axis 18H
80 to 280K
Vert Axis 18V-18H
0 to 100K
Color = # of Samples
1(blue) 1E7(purple)

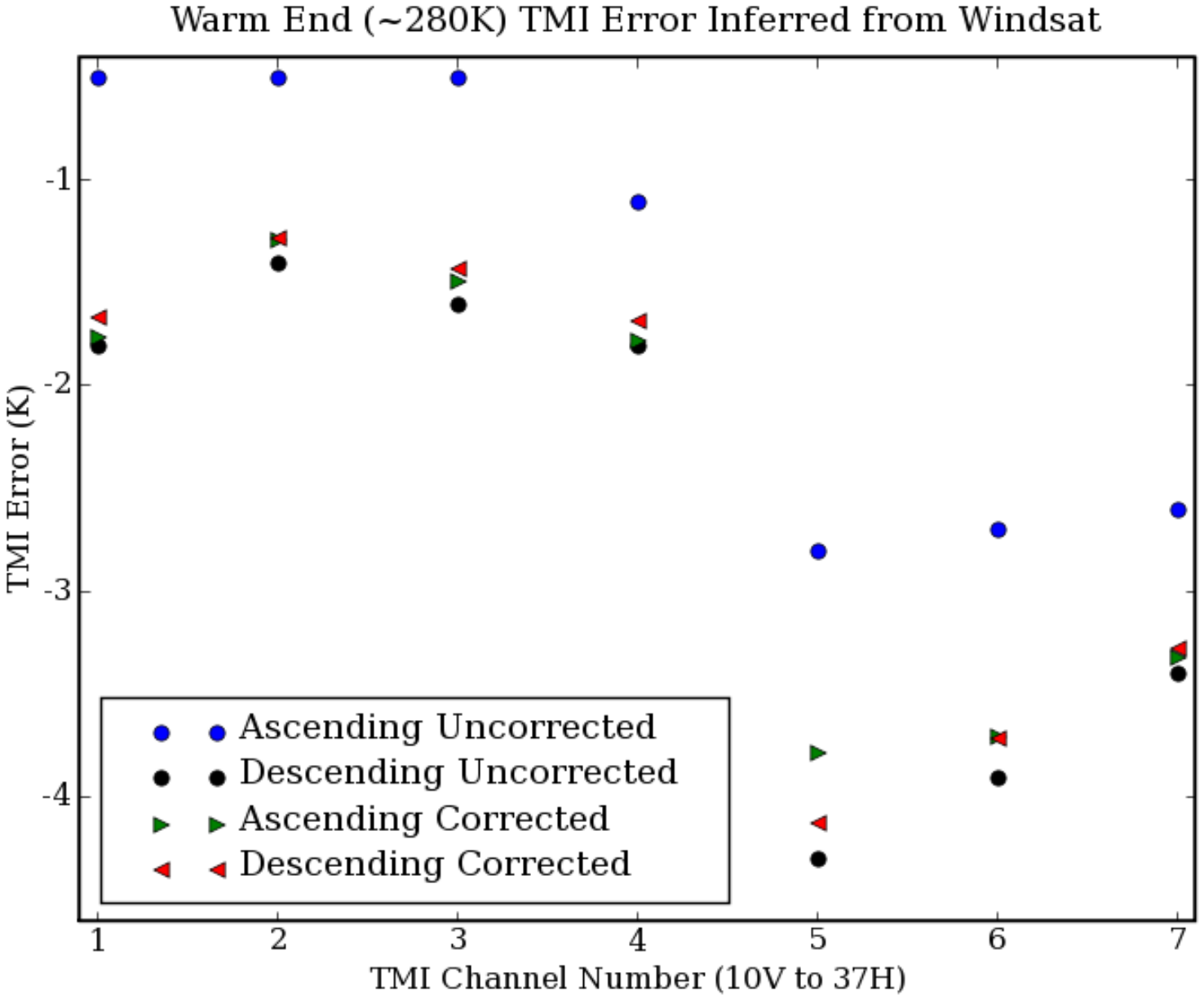

AMSR-E 1X July 2005
Ocean only
Horiz Axis 23H
100 to 280K
Vert Axis 23V-23H
-10 to 90K
Color = # of Samples
1(blue) 1E7(purple)


Windsat 1C July 2005
Ocean only
Horiz Axis 37H
100 to 280K
Vert Axis 37V-37H
-10 to 90K
Color = # of Samples
1(blue) 1E7(purple)


POST BOOST [Sep, 2001 - Dec, 2008]
Solar Beta Angle(deg)
Time Since Eclipse Start(min)
Raw Table [YAW = 0^0]
Beta Angle (deg)
Orbit Time SInce Start of Eclipse (min)
Raw Table [YAW = 180^0]
Beta Angle (deg)
Orbit Time SInce Start of Eclipse (min)


Tb bias change over orbit (K)
Orbit time since eclipse (min)
Thermal model 0 deg 0 yaw
Empirical estimate 0 deg 0 yaw


Tb bias change over orbit (K)
Orbit time since eclipse (min)
Thermal model 0 deg 180 yaw
Empirical estimate 0 deg 180 yaw


Warm End (~280K) TMI Error Inferred from Windsat
TMI Error (K)
-1
-2
-3
-4
1
2
3
4
5
6
7
TMI Channel Number (10V to 37H)
Ascending Uncorrected
Descending Uncorrected
Ascending Corrected
Descending Corrected